MULTIMEDIA UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

# FINAL EXAMINATION

**TRIMESTER 1, 2015/2016**

## DTC5048 – DIGITAL COMMUNICATION SYSTEM

(All Groups)

17 OCTOBER 2015
2.30 p.m – 4.30 p.m
(2 Hours)

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**INSTRUCTIONS TO STUDENTS**

1. This Question paper consists of 4 pages with 4 Questions only.
2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.

## QUESTION 1 [25 MARKS]

a) Draw the block diagram of communication systems which include the subsystem of the system. Explain the function of the subsystem.

[10 marks]

b) What is the bandwidth for a channel with a 474.8bps and a signal-to-noise ratio of 3dB?

[3 marks]

c) Sketch the sampled signal resulting from a 1kHz sine wave at 5kHz rate with the pulse width $\tau = 10\,\mu s$ by using the following techniques:

(i) Flat top sampling.
(ii) Natural sampling.

[6 marks]

d) Figure 1 shows a block diagram of transmission system using Pulse Code Modulation (PCM). Name X and Y. State their function.

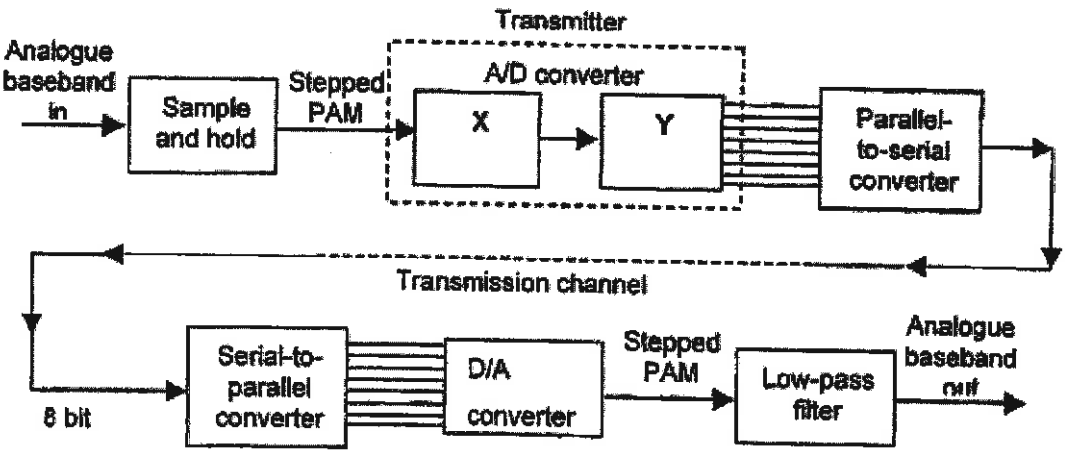


Figure 1

[6 marks]

**Continued.....**

## QUESTION 2 [25 MARKS]

a) State **three** mechanism for digital-digital encoding.

[3 marks]

b) Give the definition of polar encoding.

[2 marks]

c) List all the categories in polar encoding scheme.

[3 marks]

d) List **two** problem occur in unipolar encoding.

[2 marks]

e) State **one** advantage and **two** disadvantages in Return to Zero scheme.

[3 marks]

f) Encode the data stream 01011001 using the following encoding schemes:
   (i) Unipolar
   (ii) NRZ-L
   (iii) RZ
   (iv) Manchester
   (v) Differential Manchester
   (vi) AMI

[12 marks]

**Continued.....**

## QUESTION 3 [25 MARKS]

a) List all mechanism in digital-to-analog conversion.

[4 marks]

b) State the most popular technique use in amplitude shift keying.

[1 mark]

c) Given a bandwidth of a transmission medium used is 4,000Hz (1000 to 5000 Hz).

(i) Find the carrier frequency in each direction of transmission if transmission is in ASK full-duplex mode. Assume there is no gap between the bands in two directions.

[5 marks]

(ii) Calculate the bit rate, if the transmission is in FSK full-duplex mode. Given that the difference between the carrier frequencies is 1000Hz.

[4 marks]

(iii) Calculate baud rate and bit rate for 8-PSK half-duplex mode transmission.

[5 marks]

d) A constellation diagram has eight equally spaced points on a circle. It is found that the bit rate is 5700bps. Determine the modulation scheme, baud rate and the angle between two points. Draw the constellation diagram.

[6 marks]

**Continued.....**

## QUESTION 4 [25 MARKS]

a) Compare coherent and non-coherent demodulation.

[6 marks]

b) Define the following:
   (i) Noise.
   (ii) White noise.
   (iii)Additive white Gaussian noise (AWGN) channel.

[6 marks]

c) A binary transmission system transmits 50,000 digits per second. Gaussian noise, with rms value of 0.2 V, is added to the signal during transmission. Assuming that at the decoder (where the digits are converted back to a desired output form) the signal pulses are 1 V in amplitude, calculate the average time between decision errors of this system? How is this average time changed if the signal pulses are doubled in amplitude? Assume that 1's and 0's are equally likely to be transmitted.

[6 marks]

d) List out **two** type of spread spectrum.

[2 marks]

e) Give **one** example of application of spread spectrum

[1 mark]

f) Describe **two** basic types of multiple access techniques.

[4 marks]

**End of Page.**